NO. 26.

THE
Sidereal Messenger.

Conducted by Wm. W. PAYNE,
Director of Carleton College Observatory.

AUGUST, 1884.

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"He telleth the number of the stars; He calleth them all by their names.

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XUM

The Sidereal Messenger.

Conducted by Wm. W. PAYNE, Director of Carleton College Observatory, Northfield, Minn.

"In the present small treatise I set forth some matters of interest to all observers of natural phenomena to look at and consider."—GALILEO, *Sidereus Nuncius*, 1610.

VOL. 3. NO. 6. AUGUST, 1884. WHOLE NO. 26.

THE STARS OF THE PLEIADES.

BY H. M. PAUL.

In the *Monthly Notices* of the Royal Astronomical Society for May, 1884, is an abstract of a paper presented by Prof. PRITCHARD, upon the "*Proper Motions of Forty Stars in the Pleiades.*" The work was undertaken at the Oxford University observatory, to test the capacity of a new differential micrometer, intended to measure arcs up to 20′, by comparison with the relative positions of the stars of this historic group, as determined by BESSEL with the Konigsberg heliometer about 1840.

The micrometer is not described in the abstract given, but, becoming satisfied with its accuracy as the work progressed, Prof. PRITCHARD extended this work to cover a complete re-determination of the relative positions of 40 of the principal stars; and by a comparison of the results with those of BESSEL's heliometer measures of 1840, and with WOLF's filar micrometer measures made at the Paris observatory about 1874, he has deduced the evidence thus far available bearing upon the question of relative proper motion among these stars. He has also re-discussed all the available meridian determinations of the absolute places of

14 of the brighter stars made from the time of BRADLEY, about 1750, to the present time, and compared the resulting proper motions with those deduced from the three sets of differential measures.

Prof. NEWCOMB in his *Catalogue of 1098 Standard Clock and Zodiacal Stars* discussed this same question, making use of the meridian observations and of BESSEL'S and WOLF'S triangulations and his conclusions were expressed as follows:

"I therefore conclude that although a certain amount of relative proper motion must exist in this group, yet the apparent motions, as observed, are as much due to errors of observation as to the actually existing motions, and when the latter shall finally be discovered they will, on the average, be found as near to zero as to the values indicated by all the observations yet made. Consequently, the most probable values of these relative proper motions must be regarded as zero."

Prof. PRITCHARD, from the general agreement of his observations with those of the later determinations, seems to feel authorized to assert a little more positively the actual existence of these relative proper motions. His conclusions are as follows:

"First, with regard to the 14 stars which have been measured by the two thoroughly independent processes; the general accord of the final results points unmistakably to the existence of certain small motions of these stars *inter se*; but of so slight an amount, that their exact determination does not seem fully within the reach of observations as yet extant; these must be left for the effects of a greater lapse of time, which shall make them more directly apparent in amount, and to the astronomy of the future. Of the remaining stars, although meridian observations do not at present exist so as to corroborate the evidences of relative motion afforded by the combined micrometer measures made at Konigsberg, Paris, and Oxford, nevertheless the fact of these minute displacements is, I think, now established beyond doubt."

Prof. PRITCHARD'S results, when published, will form a valuable addition to the literature of this subject; for, the uses to which an accurate knowledge of the relative posi-

tions of such a large cluster of stars can be put, are quite various in practical astronomy.

Not the least important of these uses is the possibility of an extremely accurate determination of the occultation semi-diameter of the *Moon* from a carefully observed occultation of as many stars as possible in this group, as pointed out by the late Prof. PIERCE, and as shown by the writer's discussion * of two occultations of the *Pleiades* observed at the Naval observatory in 1877 and '79.

Astronomers, however, will hardly rest contented with the determination of the star positions in this group until it rests upon a thorough measurement with some such instrument as the Yale College heliometer which, both, from its construction and form, its being the largest and most perfect instrument of its kind yet mounted, is by far the best adapted to this kind of measurement. It is to be hoped that Dr. ELKIN will find opportunity thoroughly to attack this group of stars soon, and that, if the aperture will allow it, the measurement may be extended to fainter stars than touched by BESSEL, for upon the dark limb of the *Moon*, the occultation of a tenth magnitude star is just as valuable as any other if only its position is as accurately known, and the filar-micrometer measures of WOLF, extending to stars of about the 9.5 or 10 magnitude, increased BESSEL'S catalogue of 53, up to 79 stars; while his catalogue of approximate positions and chart of stars to the 13 or 14 magnitude, increased the number to 571.

U. S. Naval Observatory,
Washington, July 7, 1884.

Observers having large telescopes are requested to bear in mind the 7th magnitude star preceding *Beta Capricorni* by 14 seconds. From the singular behavior of the star, Nov. 6, 1883, during occultation by the *Moon*, Mr. BARNARD of Nashville, thinks it must be a close double. Other good observers noticed the strange appearance during occultation, but all are not satisfied with Mr. BARNARD'S explanation.

* *The Occultation Semi-diameter of the Moon*, by H. M. PAUL, Wash. Observations 1879, App. II.

THE PLANETS AND CYCLONES.*

BY WM. W. PAYNE.

In June, 1881, it will be remembered that *Saturn*, *Jupiter*, *Mars* and *Venus* were apparently so near together in the heavens, that the group might be covered with the hand before the eye. About this time much was said and written about the conjunction of four great planets, and the probable effect of such an event in terrestrial affairs. It was claimed by persons acquainted with science and history, that similar conjunctions of the planets had marked epochs, or crises, of special significance in the annals of the past. Some will remember that the conjunctions of *Saturn* and *Jupiter* either a little preceded, or astronomically coincided with, the Deluge, the birth of MOSES, CYRUS, CHRIST, CHARLEMAGNE, and LUTHER, and other notable events; and astronomers know that these computations have been recently reviewed and are mainly correct.

From these facts and others like them, it is easy to see why there should be public interest, and some personal anxiety, in the occurrence of an apparent conjunction of several of the major planets, especially in the minds of those who do not well understand the relations of the planets to one another and to the *Sun*, as expressed by the word "conjunction," which simply means that such heavenly bodies are equally far eastward in their orbits from some given point, as the vernal equinox. If people generally knew and believed that the planets, at such times, move in their orbits as usual, neither themselves changing nor being changed, in any important sense, there would be no real alarm, only a curious interest in such events because they are somewhat rare. The conjunctions of the great planets, *Jupiter* and *Saturn*, may occur at intervals of about twenty years and are, therefore, not novel phenomena, by any means; and hence it is not a wonder, on account of frequency, that they are sometimes coincident with prominent

Chicago Advance.

historical events. The last two conjunctions of these planets occurred October 24, 1861, and April 21, 1881. *Jupiter* and *Venus* were apparently so three times in 1881 between Feb. 21 and June 6. *Saturn* and *Venus*, *Saturn* and *Mars*, and *Jupiter* and *Mars*, were respectively once in conjunction before August 1st of the same year. It thus appears that four large planets, nearest the earth, were in frequent conjunction by twos, 1881, one being triple, but no one occurring between three different planets at the same time. A conjunction between three planets at the same time is a rare thing. In 1872, it was shown by Professor D. KIRKWOOD that a conjunction between any three of the four largest planets, *Jupiter*, *Saturn*, *Uranus* and *Neptune*, can probably never take place at the same time.

While it is true that a conjunction of the great planets produces no marked disturbance, it is believed by high authority that such events have slight influence on the *Sun* through media and in ways, not yet understood. When either *Jupiter*, *Venus* or *Mercury* passes nearest the *Sun* in their respective orbits, the solar surface seems to show greater activity than usual, though no marked changes have been observed, nor could they be naturally expected from such a cause. On the other hand, it is well established that intense solar activity produces magnetic storms in the earth's atmosphere, some of which have been singularly powerful in recent years. Whatever influence the perihelion passage of certain planets may have in agitating the solar surface, it is plain that the earth must share in the results. If these be very small, or too delicate to measure by known methods, it should not be forgotten that they may be constant and extend over considerable periods of time, and that conjunctions, or near groupings, of the major planets are favorable times for the exercise of these unknown cosmic forces, whatever they may be in kind or extent.

But the most important thing that the general reader wishes to know probably is, what astronomy can say, if anything, about the causes of tornadoes and cyclones, wheth-

er there is any such relation between the perihelia, or the conjunctions, of the planets and the *Sun* as to the effect the meteorology of the earth. Is it known that solar activity from this cause, is so modified or intensified that science can use the configurations of the planets at any time as a factor in forecasting particular changes in the average climate for a year? Certainly not. The known effects of such causes are too small to yield any appreciable influence on the average of temperature or rain-fall.

If it is known that great disturbances of the *Sun's* surface immediately affect the electrical and magnetic conditions of the earth's atmosphere, may not observations of *Sun*-spots and *faculæ* be of advantage in the study of terrestrial meteorology? This is undoubtedly true in a limited degree, but our knowledge of the tremendous forces of the *Sun* is so imperfect and so imcomplete, that their laws can not yet be stated for the meteorologist or the weather-observer. It is a wonder to some that more work in observing the *Sun* is not done in America, in view of the worthy examples of leading English and French observatories. Astronomical photographs and observations of the *Sun* ought to be taken daily, so as to form a continuous annual record, that the same might be compared with continuous Signal Service reports, and especially with the continuous self-recording registers of magnetic force, now wisely cared for by the Coast and Geodetic Survey of the United States. By this means it might be known, in time, how, and to what extent, the *Sun* shapes the seasons of earth from year to year, by the operation of the forces now under consideration.

Recent interesting coincidences invite astronomers to this study. The year 1883, very probably, marks the maximum of a passing *Sun*-spot period. In some locations, certainly, last year will long be remembered for its cyclones and tornadoes. In a group of nine Western States, the Signal Service reports the occurrence of over forty of these dreadful storms within the space of four months.

Enough data have not yet been published for a full comparison with previous years, yet the indications are that the storms of 1883 were more in number and more destructive than in any years immediately before. If the meteorologist is right in supposing that the intensity of the cyclone's power depends largely on the presence of electricity, it is important to know something more of the relation existing between the magnetic state of the atmosphere and the velocity or penetrating power of wind force. With such knowledge, science will certainly better understand the laws of storms, and thereby be able to predict their approach for the safety of life and property.

Carleton College Observatory.

OBSERVATIONS OF A SPLENDID METEOR TRAIN.

WILLIAM R. BROOKS.

A very fine meteor was discovered here on the evening of July 3rd, 1884, about half past eight o'clock, moving from the region of *Polaris* to the northwest point, and downwards at an angle of about 45°. I did not see the meteor itself, looking at the time in an opposite direction; but my little daughter, Anna Caroline, about six years of age, saw it and excitedly called my attention to it with the words, "Oh papa see! a meteor!" I quickly turned but it had disappeared. I was rewarded however by an observation and study of the train—the most brilliant and wonderful it has ever been my privilege to witness. Notwithstanding the bright twilight glow of that early hour the train of light stood out bold and distinct thereon, resembling a brilliant naked-eye comet, for which for a moment it could have been easily mistaken. At first it was quite straight, but in three or four minutes it began to curve in different directions still maintaining its distinct outlines. Then nuclei or points of condensation would form in various parts of the train which slowly expanded and diffused until they became invisible. These nuclei were distinctly seen by the aid of a small glass, and I regret that on account of being

about half a mile from the observatory at the time, I was not able to turn the large reflector upon this very interesting phenomenon. The train of light was visible to the naked eye fully ten minutes and in a good telescope could have been seen much longer. I have in several instances while comet-sweeping, ran upon a curious twisting mass of meteoric smoke or *debris* quite invisible to the naked eye, but never anything equaling this in brilliancy and variety of detail.

Red House Observatory,
Phelps, N. Y., July 12th, 1884.

THE TAIL OF THE GREAT COMET OF 1882.

E. E. BARNARD.

Having fortunately secured a number of sketches of the famous comet of the fall of 1882, I have selected those of the naked-eye views that have the most importance as a record of the size, position, etc. of the tail. The two small stars shown near the end of the tail in the later drawings, have been recognized as 10 and 16 *Hydræ*. These stars were found in the Cincinnati observations for 1880–82, where MR. WILSON gives their places for 1882.0, as:

10 *Hydræ* $\left\{ \begin{array}{l} \alpha = 8^{h}\ 36^{m}.3 \\ \delta = -15^{\circ}\ 31' \end{array} \right.$
16 *Hydræ* $\left\{ \begin{array}{l} \alpha = 8^{h}\ 40^{m}.9 \\ \delta = -13^{\circ}\ 7' \end{array} \right.$ From Heis's Catalogue.

These objects served admirably for locating the end of the tail and determining its breadth.

From the original sketches I have formed the following table of length and breadth of the tail.

DATE 1882.		OBS'D LENGTH OF TAIL.		OBS'D BREADTH OF TAIL.	
September,	22.72	15° Estimated		1°.50 Estimated	
October,	15.7	17°-18 Approximately.		... Br'der than formerly.	
"	19.7	17°-18		...	
"	26.7	17°.83	Measurements from sketches.	3°.03	Measurements from sketches.
"	31.7	18°.80		3°.06	
November,	6.65	18°.10		3°.29	
"	10.65	17°.74		3°.50	
"	15.65	17°.16		4°.44	

NOTES IN CONNECTION WITH THE SKETCHES.

Sept. 22.72. Tail projecting above horizon at $16^h\ 55^m$, very strongly outlined, narrow; dark space along axis reaching nearly to nucleus. Length 15°; broadest part of tail $=1\frac{1}{2}°$; slightly convex to south side, end abrupt and sharply defined. At $17^h\ 15^m$ angle of tail with S. E. horizon $=45°$.

Oct. 15.7. Extremity "swallow" or "fish-tailed"; southern part best defined and longest. *Sunward* tail very distinct to naked eye—so yesterday A. M.—as a smeary haze projecting in front of head (some 4° or 5° long in telescope, and very noticeable, the axis of this tail coincides with axis of nucleus, but not with that of main tail.)

Oct. 19.7. Not so bright as formerly. Nucleus to naked eye equals 3rd magnitude at least; *Sunward* tail faintly visible to naked eye. Large tail, as formerly, abrupt and "swallow tailed." Broader than formerly; southern side much the brighter.

Oct. 26.7. Bright *Moon*. Comet seen through openings in clouds. Conspicuous to naked eye. Nucleus=4 mag. or 5 mag. Tail some 20° long [this estimation too great] carefully located in sketch, the end a little indefinite from moonlight. Not certain of convexity of south side.

Oct. 31.7. End of tail confused, so also the northern side to $\frac{1}{3}$ its length from end. South side best defined. Nucleus as bright, but very much more noticeable than the

small star just *n. p.* the head, the distance between this star and nucleus, is a little greater than that between *Lambda* and ν *Hydræ*, its distance from the body of the comet equals the breadth of comet at that place. The body of tail becomes dim at about $\frac{1}{2}$ its length back from head. *n. f.* side very much blended and rather broad. The comet is a bright object with $\frac{1}{2}$ *Moon*.

Nov. 6.65. Very beautiful and bright. Tail extends to and among the two stars [16 and 10 *Hydræ*]. South side brightest and slightly convex. Observation suddenly stopped by clouds.

Nov. 10.65. Tail about as long as ever, but very bushy; almost, if not quite 4° broad near extremity. Cannot certainly make out the "swallow tail," but think it occasionally seen. South side altogether the brighter. There is a small star just back of the nucleus in the head. To naked eye, nucleus is merely a lightish spot. The eastern of the two stars [16 *Hydræ*], just clear of north end of tail; the western [10 *Hydræ*] is involved.

Nov. 15.65. Beautiful. Tail as long as ever, but very bushy; and diffuse at the end where its width is over 4°; a projection from middle of the end suspected. Nucleus 4 mag. or 5 mag.

To avoid confusion, by numbering or lettering, the preceding diagram of all the stars shown in the sketches is more convenient.

Those of the stars that have been identified, certainly, are given in the following table, the numbers refer to those on the diagram:

No.	STAR.	RIGHT ASC'SION 1882.0. DECLINATION 1882.0.		REMARKS.
1	α Hydræ.	$9^h\ 21^m.9$	$-8°\ 9'$	
2	16 "	$8^h\ 40^m.9$	$-13°\ 7'$	Marked 12 on Proctor's new star atlas.
3	10 "	$8^h\ 36^m.3$	$-15°\ 31'$	Marked 9 on Proctor's new star atlas.
4	λ "	$10^h\ 4^m.9$	$-11°\ 46'$	
5	ν^2 "	$9^h\ 59^m.4$	$-12°\ 30'$	
6	ν^1 "	$9^h\ 45^m.8$	$-14°\ 16'$	
7	π "	$10^h\ 20^m.4$	$-16°\ 14'$	
8	Not identified.	$9^h\ 50^m\pm$	$-17°\ 59'\pm$	Place taken from sketch; Of 5m or 6m.
9	69 Hydræ	$9^h\ 27^m.8$	$-20°\ 36$	Cincinnati obser'tions.
10	59 "	$9^h\ 21^m.9$	$-21°\ 50'$	"
11	79 or 80 "	$9^h\ 35^m.9$	$-23°\ 4'$	5m or 6m; sketch shows only one star, uncertain which of the two was observed.
		$9^h\ 37^m.0$	$-23°\ 23'$	
12	θ Antlia	$9^h\ 38^m.2$	$-27°\ 13'$	Place from Proctor's new star atlas, 1880.

These stars are all naked-eye objects. No. 11 was involved in head back of nucleus, (see sketch, Nov. 10.)

No. 10 is shown in sketches for Oct. 31, Nov. 6, Nov. 10, (involved in body of comet.)

Vanderbilt University Observatory,
Nashville, Tenn., June, 1884.

NUMBER OF SUN-SPOTS.

WM. DAWSON, SPICELAND, IND.

The following observations were begun March 28, 1867, for my own satisfaction, and without any view to their publication. But it now seems proper that others interested in the number of spots on the *Sun*, might see what I have recorded of them. The telescope used is 4 6 inches aperture and about 70 inches focus.

Previous to May, 1878, I used a direct eye-piece, with a 2-inch cap, or diaphram over the object-glass; and a red shade-glass on the ocular. Since then I have used a reflecting-prism, and shade-glass of a neutral tint, with full aperture. Nearly all the observations were made with the 100 eye-piece; and generally about 8 to 9 a. m. A descrip-

tion of position, size, etc., accompanies very many of the original observations; and a number of drawings were made at different times.

On June 19, 1870, a power of 200 showed 14 groups and 537 spots; June 22, 675 spots; 26, 250 in one group.

August 27, 1870, I saw 14 groups and counted 950 spots with 200 eye-piece, and 300 with 50 eye-piece. I think this the maximum of that period. About this date my eyesight was failing, which I attributed in part to so much intense looking at sun-spots. So I thought best to quit counting the spots, and simply note the number of groups, large and small. So at the beginning of 1871, the last two vertical lines in the three-line columns, show the number of small groups and large groups, instead of the number of groups and number of spots, as were given previous to 1871, and for 1878 and since.

In one sense I much regret not having the number of spots for several years after 1870; and especially the fewness of observations in 1873–1877. But I am fairly reconciled in the one consideration, that my eyes are still good and strong, excepting long sight, which is beautifully corrected by the use of spectacles.

Various matters combined to prevent a continuous regularity of observations at some other times. However, I have enough to indicate the great irregularity and sudden changes of sun-spots; and also the periodicity. The few observations of 1874–1877, need not be tabulated. They are: 1874—March 29, 2 small groups; May 6, 1 small group and 3 large ones; May 8, 3 small groups and 1 large; July 9, 1 large group and several small ones, and two spots visible to naked eye; July 12, a number of small groups near east edge; July 19, 2 small groups and 1 large; December 3, 2 small groups. 1875—March 27, 1 group and 2 large spots; April 4, 2 or 3 little groups. 1876—July 22, but few sun-spots lately; July 26, 1 prominent spot. 1877—July 12, 15, 19, 26, and August 6, 21, no spots; Aug. 25, 1 group and 8 spots; September 2, no spots; Sept. 25, 2 little spots.

For August 1881, I have the following observations made with a large spy-glass, power 36. 1881—July 27, 2 large spots north of center. Aug. 1, 2 groups; 1 very large spot and several small ones; 8, about the same as 1st; 11, 6 prominent spots, 1 large; 15, no spots; 17, 1 group and 3 prominent spots; 20, 3 or 4 groups; 21, another large group just on at east edge; 24, spots very prominent; 29, spots very prominent, and 1 very large group. September 3, 6 large spots and several small ones; 7, 2 or 3 prominent groups and several spots.

I have noticed *several*, perhaps 30 or more naked-eye spots, at different times. The use of a small glass micrometer indicated their size—the umbra—to be from about 8,000 miles 30,000 miles or more in diameter.

NUMBER OF GROUPS AND SPOTS.

Date.	Groups.	Spots.	Date.	Groups.	Spots.	Date.	Groups.	Spots.	Date.	Groups.	Spots.	Date.	Groups.	Spots.
	1867.		17	0	0	22	1	1	3	2	16	29	2	7
	March.		21	0	0		Sept.		6	4	17	30	1	7
			22	0	0	8	0	0	8	2	6	31	3	12
28	0	0	26	0	0	14	1	15	10	1	14		June.	
29	0	0	28	0	0	15	1	15	13	2	19	3	2	20
	April.			July.		16	1	9	16	2	27	4	2	20
7	3	20	2	1	1	17	1	8	17	2	30	5	2	3
11	0	0	3	1	1	19	1	7	22	1	9	7	3	5
12	0	0	4	1	1	20	1	2	23	1	7	8	3	15
13	0	0	7	0	0	26	0	0	24	2	6	10	1	1
17	0	0	8	0	0		October.		26	1	2	11	1	2
18	0	0	9	0	0	6	2	7	27	1	10	12	0	0
30	0	0	13	1	2	15	1	1	28	1	5	13	0	0
	May.		14	1	1	17	1	1	30	1	2	14	0	0
1	0	0	16	1	1	18	1	1		May.		19	1	1
8	0	0	17	1	1		November.		3	1	1	22	1	4
12	0	0	18	1	1	5	1	1	4	2	2	23	2	7
17	0	0	20	0	0		1868.		5	2	5	24	2	8
24	1	4	21	0	0		February.		6	2	9	25	2	8
26	2	11	22	0	0	12	1	1	8	1	16	26	2	9
31	2	2	29	0	0		March.		9	2	34	27	1	8
	June.		30	0	0	8		5	11	2	21	30	4	12
1	1	1		August.		15	2	25	17	2	6		July.	
2	1	1	3	0	0	17	1	25	18	2	5	6	0	0
3	1	1	6	0	0	19	1	7	19	2	7	7	0	0
4	1	1	7	0	0	22	0	0	20	2	9	9	0	0
7	0	0	9	0	0	29	2	17	22	2	2	11	0	0
10	1	1	14	0	0	31	2	27	24	0	0	15	1	2
11	0	0	15	0	0		April.		26	0	0	16	2	5
14	0	0	16	1	2	2	3	15	28	1	6	20		4

Date.	Groups.	Spots.
21		8
22		8
25	1	30
28	2	33
August.		
3	2	8
5	1	6
9	1	1
11	1	6
14	1	5
15	2	15
22	2	10
September.		
3	2	10
4	1	6
17	3	6
27	1	7
30	3	11
October.		
4	3	7
11	4	5
12	4	7
22	2	11
29	10	100
November.		
2	6	126
5	3	32
6		11
8	1	1
12	2	26
14	4	52
15	7	68
22	3	12
23		16
26	2	11
29	4	10
December.		
2	3	6
14	6	29
16	4	10
18	1	1
20	2	2
25	3	14
1869.		
January.		
3	7	15
6	7	16
7		14
20	2	3
22	2	3
23	2	2
28	3	54
31		50

Date.	Groups.	Spots.
February.		
11	3	30
14	5	50
19	4	9
March.		
14	10	50
April.		
7	0	0
11	1	60
17	4	60
25	3	7
May.		
2	7	95
7		157
8	9	175
10	10	191
15		125
17	4	60
19	4	22
22		20
23	3	38
24	2	25
25	4	43
27	5	77
28	6	82
31	8	144
June.		
1	8	215
2	7	200
3	8	225
6	12	111
7	12	124
10	11	75
14	5	21
16	8	27
17	9	31
18	9	39
19	12	65
20	10	61
24	13	192
25	12	120
July.		
1		33
3	8	50
8	2	32
16	5	32
19	8	100
21	8	63
27	5	32
August.		
1	4	12
2	5	20
3	5	26

Date.	Groups.	Spots.
8		47
14	7	43
16	7	29
17	7	43
26	9	60
30	3	12
September.		
3	5	60
5	7	119
12	9	83
15	6	50
19	6	30
26	5	63
28	3	45
October.		
3	4	36
10	7	23
17	8	44
18	7	50
31	6	60
November.		
2	6	47
15	8	80
24	5	40
December.		
20	11	60
24	5	40
28	7	25
1870.		
January.		
18	5	38
21	9	50
27	4	56
February.		
4	5	45
7	7	50
8	8	80
10	7	107
12	6	70
13	7	100
20	7	60
21	8	50
23	6	18
24	6	30
25	6	38
March		
2	6	120
9	10	140
10	9	107
18	7	154
23	9	100
24	10	116
29	9	132

Date.	Groups.	Spots.
April.		
3	9	238
4	9	242
6	8	235
8	8	220
11	6	94
12	7	94
17	6	32
18	8	
21	8	72
22	9	106
24	9	126
26	9	112
29	8	74
30	7	108
May.		
1	8	109
2	9	120
4	8	166
8	9	147
9	8	134
15	8	275
16	8	275
17	10	206
20	9	175
22	8	150
25	9	180
28	10	166
29	9	160
31	6	82
June.		
1	8	76
2	9	82
4	8	102
6	7	116
9	7	110
13	6	86
18	10	226
19	13	349
21	13	382
23	11	340
26	7	440
27	9	472
July.		
3	8	261
5	9	166
17	10	
21	10	
24	7	
31	8	
August.		
4	6	
7	8	

Date.	Groups.	Spots.
15	11	
16	11	
21	7	
27	11	640
28	14	544
30	12	407
31	13	382
September.		
11	7	31
13	4	44
18	4	370
21	6	460
October.		
6	8	
9	10	
15	20	
23	11	300?
31	9	
November.		
7	12	
12	15	
13	15	
27	6	
December.		
2	13	
4	12	
8	12	
16	12	
29	6	
1871.		
January.		
Date.	Small Gr'ps.	Large Gr'ps.
1	6	2
12	5	5
February.		
20	10	3
27	5	4
March.		
10	7	2
12	7	2
April.		
2	10	4
5	10	2
12	10	3
13	9	4
16	7	5
17	5	5
23	15	2

Date.	Large Gr'ps.	Small Gr'ps.
27	11	1
	May.	
1	11	2
2	10	1
7	8	3
11	9	2
14	8	1
22	14	3
24	14	2
28	10	3
	June.	
7	13	0
9	11	0
11	15	1
26	9	1
	July.	
2	7	1
8	10	2
15	6	2
22	2	9
23	5	6
30	3	4
	August.	
7	4	2
13	3	5
16	4	5
17	5	4
29	3	3
	September.	
1	11	1
	October.	
1	5	1
8	6	2
13	5	3
22	10	1
	November.	
5	13	2
16	14	1
	1872.	
	February.	
9	10	2
	March.	
10	1	0
24	9	4
	April.	
2	6	4
14	7	2
24	5	3
28	2	3
	May.	
5	11	4

Date.	Small Gr'ps.
10	2
19	2
26	2
	June.
9	4
16	2
30	4
	July.
4	3
9	7
	December.
4	0
	1873.
	February.
19	5
	March.
11	1
23	1
28	4
	April.
6	1
	May.
20	0
	June.
1	1
	November.
16	1
	December.
14	0
	1878.
	February.

Date.	Groups.	Spots.
	March.	
6	3	25
17	0	0
21	0	0
26	0	0
28	0	0
	April.	
1	0	0
4	0	0
7	0	0
8	0	0
10	0	0
12	0	0
16	0	0
21	0	0
23	0	0
25	0	0
	May.	
21	1	2
26	1	5
28	2	16
	June.	
16	0	0
23	1	3
	July.	
14	0	0
21	0	0
	August.	
4	0	0
11	0	0
21	0	0
27	0	0
	September.	
1	1	1
2	1	1
5	1	1
8	1	1
13	1	1
15	0	0
29	0	0
	October.	
6	0	0
13	0	0
20	0	0
	November.	
3	1	3
19	0	0
22	1	1
24	0	0
	December.	
6	0	0
	1879.	
	January.	
18	0	0
21	0	0
26	0	0
28	0	0
30	1	2
	February.	
2	0	0
3	0	0
4	0	0
7	0	0
8	0	0

Date.	Groups.	Spots.
9	0	0
13	0	0
14	1	4
15	1	7
18	0	0
20	0	0
22	0	0
23	0	0
25	1	4
28	0	0
	March.	
1	0	0
3	0	0
4	0	0
5	0	0
7	0	0
9	0	0
11	0	0
12	0	0
14	1	1
16	0	0
17	0	0
18	0	0
23	0	0
24	0	0
25	0	0
28	0	0
29	0	0
31	0	0
	April.	
2	0	0
5	0	0
6	0	0
7	0	0
11	1	5
12		16
13	1	9
16	1	25
20	1	7
21	1	1
22	1	1
23	1	1
24	0	0
26	0	0
28	0	0
29	0	0
30	0	0
	May.	
1	0	0
2	0	0
4	0	0

Date.	Groups.	Spots.
5	0	0
6	0	0
7	1	4
8	1	12
9	1	11
10	2	9
11	1	9
12	1	4
13	1	1
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
21	0	0
23	0	0
27	0	0
28	0	0
30	0	0
31	0	0
	June.	
3	0	0
4	1	3
5	1	4
7	0	0
8	0	0
9	0	0
10	1	2
11	0	0
12	0	0
14	0	0
16	0	0
17	0	0
19	0	0
20	0	0
23	0	0
24	0	0
25	0	0
27	1	14
29	1	30
30	2	38
	July.	
1	2	30
2	2	16
3	2	17
5	2	3
6	0	0
7	0	0
8	0	0
9	0	0
10	1	14
11	1	20
12	1	14

Date.	Groups.	Spots.
13	1	8
14	1	15
15	1	8
16	1	10
17	1	4
18	0	0
19	0	0
20	1	1
21	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	1	7
29	1	4
30	0	0
31	0	0
August.		
1	0	0
2	0	0
7	0	0
8	0	0
9	0	0
10	1	8
11	2	15
12	2	29
13	2	14
14	2	9
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	1	2
25	1	15
26	2	13
27	3	21
28	2	22
29	3	26
30	2	16
31	3	19
September.		
4	1	4
5	1	2
6	1	1
8	1	1
11	1	2
13	0	0
14	0	0
15	0	0
16	1	5
17	1	1
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	1	7
29	1	4
30	0	0
31	0	0
August.		
1	0	0
2	0	0
7	0	0
8	0	0
9	0	0
10	1	8
11	2	15
12	2	29
13	2	14
14	2	9
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	1	2
25	1	15
26	2	13
27	3	21
28	2	22
29	3	26
30	2	16
31	3	19
September.		
4	1	4
5	1	2
6	1	1
8	1	1
11	1	2
13	0	0
14	0	0
15	0	0
16	1	5
17	1	1
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	1	7
29	1	4
30	0	0
31	0	0
August.		
1	0	0
2	0	0
7	0	0
8	0	0
9	0	0
10	1	8
11	2	15
12	2	29
13	2	14
14	2	9
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	1	2
25	1	15
26	2	13
27	3	21
28	2	22
29	3	26
30	2	16
31	3	19
September.		
4	1	4
5	1	2
6	1	1
8	1	1
11	1	2
13	0	0
14	0	0
15	0	0
16	1	5
17	1	1

Date.	Groups.	Spots.
18	0	0
19	1	1
20	0	0
21	0	0
23	1	1
24	1	1
25	1	1
26	1	1
27	1	1
28	1	1
October.		
7	1	4
8	1	14
9	1	25
10	1	25
11	1	20
12	3	20
13	3	30
14	4	21
18	1	13
20	2	25
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
29	0	0
30	0	0
31	0	0
November.		
2	0	0
3	0	0
4	1	1
6	1	4
12	1	25?
13	1	25
16	1	3
18	1	1
19	0	0
21	0	0
24	0	0
25	1	2
30	1	9
December.		
5	1	2
9	1	3
16	1	3
22	1	1
26	0	0
31	1	4
1889.		
January.		
10	3	17

Date.	Groups.	Spots.
13	4	37
15	3	55
17	2	32
18	2	18
21	0	0
23	0	0
25	1	6
26	1	4
27	2	13
February.		
1	2	13
3	3	18
4	3	8
5	3	8
6	3	22
15	0	0
19	0	0
20	1	1
21	1	3
22	1	3
24	1	6
26	1	11
March.		
1	2	4
2	2	8
9	1	5
15	2	6
17	2	2
23	0	0
29	2	11
30	3	14
31	3	10
April.		
3	2	12
4	2	15
5	2	11
9	4	11
13	1	17
14	2	11
17	1	2
18	1	4
20	1	5
21	1	3
22	2	16
24	1	1
26	2	42
27	1	50?
29	1	50
30	1	40?
May.		
1	3	60
2	3	34
33	3	22

Date.	Groups.	Spots.
5	3	30
6	2	17
7	3	28
8	2	24
12	13	11
13	2	11
14	2	4
15	0	0
16	1	4
17	0	0
19	2	5
23	1	2
27	1	40
28	1	50
30	2	63
31	2	43
June.		
1	2	21
2	2	53
3	2	24
5	1	2
7	1	8
10	3	25
11	2	16
12	2	10
13	2	7
16	1	7
17	2	26
18	2	54
19	3	62
20	3	85
24	3	80
25	3	80
27	2	45
28	3	28
29	5	26
July.		
1	2	15
2	2	6
4	2	16
8	2	25
9	2	17
10	2	10
12	1	1
13	0	0
14	0	0
15	1	1
16	1	4
17	0	0
18	2	18
19	2	20
20	2	35
22	3	40

Date.	Groups.	Spots.
23	3	56
24	3	27
25	4	40
26	3	24
27	2	26
28	2	30
29	2	24
30	1	12
31	2	10
August.		
1	1	5
2	1	20
3	1	35
4	1	25
5	1	25
6	2	57
7	4	46
8	5	59
9	5	33
10	4	33
11	4	33
12	4	37
13	5	57
14	4	60
15	5	81
17	5	60
18	4	55
19	4	57
20	4	35
21	2	29
22	2	46
23	3	42
24	2	9
25	1	8
26	1	3
27	2	16
28	3	19
29	3	27
30	2	20?
31	2	19
September.		
1	3	21
3	3	7
4	3	4
5	4	24
6	4	27
8	9	60
9	6	80
10	6	140
13	5	90
14	5	90
15	5	62
16	4	26

Date.	Groups.	Spots.
17	5	24
18	5	43
19	6	44
21	4	31
22	4	31
23	5	28
24	4	19
28	5	80
29	4	85
October.		
1	4	108
2	4	75
5	5	8
6	4	20
7	4	16
8	3	16
9	3	33
12	3	10
13	3	13
20	4	50
21	3	55
29	4	18
31	3	12
November.		
2	4	35
8	1	2
9	3	6
12	1	3
14	1	15
18	3	21
19	3	29
22	3	12
23	3	7
27	5	53
December.		
2	2	12
9	3	10
29	2	3
30	3	8
31	4	20
1881.		
January.		
1	5	11
7	1	3
8	1	4
10	1	6
11	2	9
17	1	2
24	3	23
28	5	66
February.		
13	2	3
14	3	4
15	6	24
17	6	26
19	4	9
21	6	23
22	6	45
25	5	16
March.		
7	2	3
9	5	65
10	5	78
14	8	75?
15	8	133
17	6	65
24	2	28
26	2	4
27	2	7
April.		
4	5	20
6	6	14
10	2	6
14	4	24
16	7	50
21	6	135
22	6	145
27	1	20
May.		
6	4	29?
8	5	66
11	4	25
13	3	34
15	2	6
17	4	13
19	3	18
22	4	30
25	5	38
27	4	80
31	4	65
June.		
3	2	65
9	5	27
10	5	33
11	4	35
16	7	35
21	3	8
25	5	
30	4	90
July.		
6	8	55
9	3	44
September.		
8	3	24
9	1	43
11	4	55
12	4	65
16	2	20
17	1	40
23	2	4
24	2	4
29	6	25
October.		
9	3	28
10	4	21
20	4	60
22	4	45?
25	4	
26	4	20?
November.		
1	1	1
6	5	10
13	7	33
28	4	25
December.		
6	3	62
8	3	40
23	3	10
24	2	12
1882.		
January.		
9	3	12?
14	4	25?
17	3	10?
27	4	30
30	5	57
February.		
1	4	25
3	5	20
6	4	30?
8	5	100
13	6	60?
14	6	60
15	8	72
25	4	14
March.		
1	2	7
2	2	20
5	4	35
15	6	20
19	4	60
31	7	30
April.		
1	8	33
4	6	56
5	7	60
11	8	36
12	7	65?
13	5	65
14	7	75
15	9	140
16	8	160
17	9	175
21	6	95
24	3	35
25	3	30
27	5	25
28	3	20
30	3	18
May.		
1	3	32
7	5	60
10	7	72
15	5	125
17	7	150
20	4	75
22	2	18?
24	2	10
26	2	4
29	3	4
30	3	3
June.		
1	3	4
5	2	7
7	3	17
8	4	16
12	2	30
15	2	75
16	2	50
21	2	30
24	3	14
25	4	21
27	5	65
July.		
1	8	45
2	4	25
August.		
15	2	13
September.		
3	7	90
5	5	82
6	3	70
7	3	50?
8	3	45
12	4	32
13	2	22
14	5	40
16	1	40
17	2	55
18	2	60
19	2	30
22	3	25
23	4	28
24	6	40
25	6	60
27	6	75
28	5	70?
29	5	60
30	6	75?
October.		
1	6	100
2	5	113
4	8	80
5	9	82
6	4	61
7	6	19
9	3	8
10	2	4
12	4	17
13	3	20
14	2	45
15	3	60
16	2	42
19	2	110
20	3	108
21	5	122
22	6	17
24	5	80
26	4	63
29	2	35
30	3	42
November.		
2	4	65
4	6	70
11	5	42
14	5	27
20	6	50
22	8	80
23	8	80
25	8	68
28	8	80?
December.		
1	6	50?
1883.		
January.		
7	3	14
16	3	45
18	3	50?
24	6	12
February.		
12	5	75
18	4	30
21	1	10
23	0	0

Date.	Groups.	Spots.
25	1	12
28	2	12
	March.	
1	2	6
4	1	1
8	4	10
9	5	16
13	6	60
18	3	21
22	4	95
24	3	70?
31	4	30?
	April.	
3	7	25
8	5	42
10	4	22
11	6	40
12	5	80
16	6	120
17	6	112
20	5	75
25	6	32
27	6	20
	May.	
1	4	22
4	3	5
6	1	3?
16	4	12
23	2	15
27	0	0
31	2	8
	June.	
1	3	50
2	5	84
4	6	110
5	6	105
8	6	55
13	3	60
14	3	75
18	2	35?
19	5	100
20	4	110?
	July.	
1	3	100
3	4	70
5	2	40
7	2	40
9	2	40
13	7	60
16	8	90
17	8	110?
19	10	165
21	7	185
24	8	230
27	6	110?
28	6	56
29	3	35
31	5	52
	August.	
4	3	8
6	2	7
7	4	14
11	5	23
12	5	33
15	4	20
18	7	21
20	4	7
22	3	40
24	6	30
27	5	85
28	5	85
30	6	115
	September.	
1	7	90
3	8	66
5	6	60
10	5	50
14	6	80
15	5	70
19	4	40
21	2	17
24	3	7
26	2	7
28	4	17
29	5	22
	October.	
3	2	4?
7	7	50
8	7	71
9	6	135
13	6	100?
15	6	150
25	5	90
30	8	80
	November.	
1	9	95
4	8	80
11	5	60
13	5	68
17	7	95
24	9	65
28	4	40?
	December.	
1	4	19
5	2	12
8	4	23
9	5	60?
12	9	120
21	8	100?
28	8	125
	1884.	
	January.	
3	5?	50?
9	10	100?
13	8	80?
16	6	90
17	6	67
22	7	40
25	5	60
31	7	70
	February.	
2	7	70
14	5	60?
23	5	40?
29	8	60?
	March.	
12	8	95
14	6	90?
21	4	50?
22	5	50
23	6	54
24	6	42
27	3	23
28	3	20
20	3	11
	April.	
1	5	40?
3	4	65
4	4	100
6	6	60
14	3	15
17	4	48
25	6	125
25	5	80
26	5	112
28	4	115
29	3	150
	May.	
2	3?	60?
7	5	40
8	4	43
11	9	85
12	5	80?
1	7	65?
16	6	25?
18	6	36
20	6	28
22	6	40
24	7	45?
28	5	65
29	4	75
30	5	70
31	4	53
	June.	
1	5	53
2	5	60
4	5	40
5	6	60
1	5	53
2	5	60
4	5	40
5	6	60
7	5	37
13	3	12
15	3	6
17	6	21
18	6	45
19	5	25
21	5	57
23	4	36
27	5	20
30	5	40
	July.	
3	7	90
6	5	55
9	4	32
10	2	27
11	3	33
14	3	50
16	3	35

Up to July 15th, the phenomenon of red skies continues as remarkable as ever. It occupies the northwestern skies in the evening, and northeastern in the morning. The phenomenon always repeats itself—that is, it will fade out and in a few minutes re-appear at about the same altitude. I have attributed the repetition to a reflection from the first, which at that time will have just sunk below our horizon.

This repetition in the mornings precedes the real phenomenon. E. E. BARNARD.

OBSERVATIONS OF THE COMPANION OF THE SIRIUS, MADE AT THE U. S. NAVAL OBSERVATORY.

BY PROF. A. HALL.

[Communicated by Commodore S. R. Franklin.]

Date.	*Sid.*	*Time.*	*p.*	*s.*	
		h	°	″	
1884.	170	5.6	39.0	8.89	very faint.
	206	6.1	38.0	8.76	faint.
	209	6.2	37.5	8.64	faint.
	225	6.8	36.5	8.76	very faint.
	231	6.7	37.5	8.87	
	247	7.3	37.8	8.95	faint.
	250	7.4	37.2	8.87	
	269	7.9	37.8	8.74	

Mean Results.

		p.	*s.*
		°	″
1884,	226	37.67	8.810

This companion has been unusually faint during the present year.

The best quick motion of the equatorial telescope in right ascension is that adopted in the Washington telescope, where the observer pulls an endless rope hand over hand, and can lock and unlock the gearing which connects the turning-wheel with the telescope at pleasure. The quick motion of the equatorial telescope in declination, by means of a loose rope attached to the two ends of the telescope, requires too strong a pull, the best method of giving this motion is through a gearing turned by an axis passing centrally through the polar axis on the Repsold plan. But it is preferable to have this motion made by turning a crank or pulling a rope rather than by taking hold of a wheel.—*Newcomb.*

EDITORIAL NOTES.

The double number of the MESSENGER, 2 and 3, Vol. I., is exhausted. Any persons returning copies of that number to our office in good condition, will be paid fifty cents each.

The call for the last number (25), has been unexpectedly great. Subscribers re-placing this number will be credited for it, by advancing their subscriptions two numbers.

Several copies of the present issue have been sent to professors and teachers of Astronomy, in colleges and secondary schools in the United States. It is common place to say that such a publication ought to be a constant help to every instructor in this delightful branch of study. And, if it furnish only the news of discovery and general work, it ought to be worth two dollars a year.

It will interest the student of cometary astronomy to know that Dr. SWIFT of Warner observatory has consented to furnish for the MESSENGER, at an early date, a complete supplemental catalogue of comets discovered since the publication of the Catalogue found in Chamber's Astronomy, (Ed. 1876). The few errors found in that good Catalogue will be corrected.

The relative proper motion of the stars of the *Pleiades* is a theme well worthy of the attention of Astronomers with measuring apparatus adapted to this difficult work. The suggestion by Assistant PAUL, of the Naval observatory at Washington, that possibly Dr. ELKIN may find time soon to use the large heliometer of Yale College observatory in this work, is indeed most fitting. Dr. ELKIN'S skill, and his fine instrument would give certain promise of the best results possible at the present time.

In the *Astronomische Nachrichten* (No. 2602), Professor HALL, Naval observatory, Washington, calls attention to the need of a uniform ephemeris of clock stars for general use. He thinks the work of securing and continuing such a catalogue should be under the direction of one office, and that the work should be so elaborate that the apparent position of a star could be interpolated with ease and certainty for any time. The cost of such a work ought not to be great, and as Professor HALL indicates, it would be very useful.

The Board of Directors of the Cincinnati University, at their meeting in June, appointed Professor J. G. PORTER to the position of Astronomer, and H. C. WILSON to the position of Assistant Astronomer of the Cincinnati observatory. These appointments take effect Sep-

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tember next. Professor PORTER was formerly an assistant at the Litchfield observatory of Hamilton College, Clinton, N. Y., has since spent several years in Europe, studying mathematics and astronomy, and now holds an important position in the U. S. Coast Survey. H. C. W.

We are indebted to Mr. WILSON, acting astronomer at the Cincinnati observatory for the following:

"As the sky was clear here July 11, I took the opportunity to observe *Venus* in conjunction. By shutting out the light of the *Sun* from the object-glass, and reducing the aperture of the eye-piece to about one-thirtieth of an inch, I obtained a very distinct view of the planet. The crescent on the north limb was very brilliant and was much thicker than I had anticipated. The cusps extended considerably more than half way around the planet. At times they seemed to flash out, so as to cover more than two-thirds of the circle. The janitor who has been accustomed to bright light from counting Sun-spots for six years, was positive that he could see the complete circle. Thought I caught a glimpse of a thread of light opposite the crescent, once or twice, but was not satisfied of its reality."

A very careful search was made by me with the nine-inch reflector on the same night the telegram was received for the suspected comet found at Vienna on May 26th, and recorded as a nebula.

On the following night also I swept very slowly, and with the greatest care, a large region of the heavens radially from the recorded place, but no suspected object was found. WILLIAM R. BROOKS.

A new Minor Planet (237), was discovered by J. PALISA, at Vienna, June 12th, 1884. It is of the 12th magnitude. The positions given by Dr. KRUEGER, Kiel, June 29th, to the *Science Observer*, in Greenwich mean time, were as follows:

		α			δ		
		h.	*m.*	*s.*	°	′	″
June	27. 4101	16	19	46.7	—19	38	25
"	28. 3729	16	19	10.6	—19	41	10

Lord CRAWFORD, Dun Echt observatory, says that the search in Europe for the suspected comet (1858 III), has been fruitless. He thinks it is very probable that the object observed at Vienna was not a comet.

In the *Monthly Notices* of the R. A. S. for May, 1884, appear three sets of measures of the position-angle and distance of the companion of *Sirius*, made by Professor HALL with the Washington 26-inch refractor, and by Professor HOUGH and Mr. BURNHAM, with the 18-inch of the Dearborn observatory at Chicago. The results are all for nearly the same epoch, and may be considered as measures of the same absolute quantities. The mean results for the opposition of 1884 are

given below, and to them are attached the probable errors resulting from the residuals of the individual observations as printed in the *Monthly Notices*. They serve to show how different observers will differ by systematic amounts which are far outside the probable errors computed from the accidental errors of their individual observations, especially in the measurement of the *distance* of the two components of such a double-star as *Sirius* and its companion.

Observer.	Date.	No. of nights	*p.*	*s.*
Hall	1884.226	8	37°.66 ± 0°.17	8″.810 ± 0″.024
Hough	.179	11	36 .68 ± 0 .12	8 .510 ± 0 .030
Burnham	.189	10	36 .39 ± 0 .35	8 .392 ± 0 .033

H. M. P.

COMET 1858, III (TUTTLE).

We learn from Special Circular, No. 46, *Science Observer*, "the possibility that the third comet of 1858 has been seen on its return to perihelion, was announced by cable message from Dr. A. KRUEGER, on the 19th inst. An observation of an object, supposed to be a nebula, was made at the Vienna observatory, on May 26, the following position having been secured:—

R. A. 17h. 43m. Decl. +35° 32′

Search for this object, on the 19th inst., showed that it was no longer in the same position, hence the supposition that it was a comet.

A second cable message was received on June 21, from Lord CRAWFORD, at Dun Echt, giving the finding ephemeris, as below. A third message, received June 24, from Dr. KRUEGER, gives also an ephemeris. Telescopes of large aperture, only, will now be able to observe the comet, should it be found."

EPHEMERIS.—LORD CRAWFORD.

Greenwich.	R. A.			Decl.		Light.
Midnight.	*h.*	*m.*	*s.*	°	′	
June 21.	17	23		+28	51	1.16
25.	17	21		27	1	
29.	17	19	20	25	9	
July 3.	17	18	36	+23	14	0.80

R. A. COPELAND, Computer.

EPHEMERIS.—DR. KRUEGER.

Greenwich.	R. A.			Decl.		Light.
Midnight	*h.*	*m.*	*s.*	°	′	
June 25.	17	32	56	+25	14	1.04
29.	17	32	28	23	29	
July 3.	17	32	32	+21	40	0.80

DR. L. SCHULHOF, Computer.

VARIATIONS IN THE SUN'S DIAMETER.

A pamphlet of 17 pages by Dr. HILFICKER, of the observatory of Neuchatel, treats the 3468 observations of the *Sun* made by 8 observers during the years 1862—1883, with the object of determining whether the *Sun's* diameter varies. The meridian circle has an aperture of 115 mm., and a magnifying power of 200 is used, and each limb of the *Sun* is observed on 13 threads, so that these observations are more suitable for the purpose, than many other series which have been used for the purpose. Beside the Neuchatel series, others are quoted; though several papers on the subject are not referred to.

Dr. HILFICKER gives two conclusions, which he regards as satisfactorily proved by his discussion. These are, 1st; that the variations in the diameter of the *Sun*, shown by the Neuchatel observations are real. 2d; that these changes depend upon the period of the Solar spots; that is, that the largest diameters co-exist with the minimum *Sun*-spots, and *vice versa*.

It will be noticed that this conclusion does not agree with those of other discussions, notably with the very satisfactory one of Dr. AUWERS, based on the results of the observations of seven observatories, or with the discussion of corresponding observations at Greenwich and Washington, by Professors NEWCOMB and HOLDEN.

OBSERVATORY OF ALGIERS.

This observatory was re-organized in 1881. The director is M. TREPIED, and the assistant M. RAMBAUD. The appropriation is 12900 francs (about $2,600). The principal instruments are, a reflector of 20 inches aperture; a reflector of 13 inches aperture; a Thollon spectroscope, giving the dispersion of 31 flint prisms; a small meridian circle; spectroscopes; apparatus for solar photography. An account of this observatory is given in *Bulletin Astronomique*, April 1884.

THE ARMAGH OBSERVATORY.

Dr. DREYER has printed (for private circulation) an historical account of the Armagh observatory, in a pamphlet of 20 pages. The frontispiece gives an autotype picture of the buildings. This account is of much interest since the history of the observatory extends from 1791 to now.

NEW CATALOGUE OF STARS.

The Armagh observatory is preparing for the press, a second Armagh catalogue of about 3000 stars, most of which have been observed from 3 to 5 times with the Mural Circle.

STATISTICS OF COMETIC ORBITS.

Dr. PAUL LEHMANN of Berlin, has re-printed a compilation with the above title, which contains much interesting information in a

tabular form. 294 cometic orbits are more or less well known: of these, 221 have parabolic orbits, and of the elliptic orbits

7	have a period				from	10,000	to 50,000 years.
23	"	"	"	"	1,000 "	10,000	"
6	"	"	"	"	500 "	1,000	"
9	"	"	"	"	100 "	500	"
6	"	"	"	"	50 "	100	"
5	"	"	"	"	10 "	50	"
17	"	"	"	"	— "	10	"

All the comets whose periods are under 10 years, have *direct* motion, and of the 28 comets whose periods are under 100 years, only 3 have retrograde motion.

An interesting table of comets with similar orbits which are yet not identical, is also given: and further a table of those comets which are related to each other in groups, so that all their orbits intersect in a line. These comets may be supposed to have had a common origin.

A NEW AND FAINT NEBULA.

I have discovered a new and exceedingly faint nebula in

$$\left.\begin{array}{l}\alpha = 17^h\ 16^m\ 45^s.8\\ \delta = -38^\circ\ 26'\ 18''\end{array}\right\} 1884.0.$$

It is a small and faint object with 6-inch telescope. The light seems to be of an even tint.

It lies $2^m\ 22^s$ following, and 3°.9 south of General Catalogue No. 4290. The place is the mean of three equatorial pointings.

General Catalogue, No. 4290, I make the place of this object to be

$$\left.\begin{array}{l}\alpha = 17^h\ 14^m\ 24^s\\ \delta = -38^\circ\ 22'\ 24''\end{array}\right\} 1884.0.$$

This place is the mean of four careful equatorial pointings. It is exceedingly faint with 6 inches, and precedes two 9^m stars by a few minutes of arc.

There is a faint star or so, close south which confuse the light of the nebula. The description of this object in General Catalogue is "!!!; ⊙; *eF*; *S*; *amSt*." It was impossible to make out its annular character.

E. E. BARNARD.

Vanderbilt University Observatory,
Nashville, Tenn.

Mr. H. H. WARD has recently published a pamphlet of sixteen pages, in which he sets out a new theory of cometary tails. Briefly enunciated the hypothesis is this:—"A comet's tail is the comet's own light transmitted through, and made co-extensively visible by the cometary shadow." Four arguments are given in support of the theory:

1. Comet's cast shadows; 2. Comet's are self-luminous chiefly; 3. Cometary light would itself be visible in transmission through the

shadow; and 4. The shadow hypothesis accounts for the phenomena attendant on cometary tails.

The paper shows thought on an important theme. Points three and four are the chief ones, and they are very difficult propositions to prove by observation, if the attention of the observer were confined to that part of the tail which always extends from the *Sun*. For instance, unequal brightness on opposite sides of the tail, while the nucleus and coma seem perfectly uniform in the telescope, definite outline to the end of the tail and there clearly divided; two, three or six tails, each having different curvature and pointing in different directions; and then what shall be said of tails that point towards the *Sun*? There are several such observations of recent record. These are a few of many such facts that seem to us difficult to explain by the new theory.

The thirty-third meeting of the American Association for the advancement of science will be held at Philadelphia, Pa., Sept. 4th to 10th. The time is later than usual to allow an interchange of courtesies between the British and American Associations, and to enable the members of the two associations to attend both meetings. The American Association and the local committee of Philadelphia have invited the members of the British Association, with their near relatives who may be with them, to take part in the Philadelphia meeting. Invitations have also been sent to the leading scientific societies abroad, inviting them to send delegates to the Philadelphia meeting. It is probable, therefore, that this meeting will be largely international in its character, and it is likely that steps will be taken, at this time, to form an International Scientific Association. The Philadelphia meeting promises to be one of very great interest in character and numbers. J. P. LESLEY, Philadelphia, is president; F. W. PUTNUM, Cambridge, permanent secretary, and JOHN WELSH president and secretary of the local committee of arrangements at Philadelphia.

TERRIFIC SOLAR ERUPTION.

In May we received a private letter of great interest, from Engineer C. W. IRISH, Iowa City, concerning a wonderful solar outburst which he observed on the 10th day of last April. We immediately asked for drawings of it and were favored by Mr. IRISH with three fine representations of what he saw. In presenting the views we are sorry to say that our engraver has come far short in giving the details of the drawings which showed great agitation of the solar surface over a considerable area.

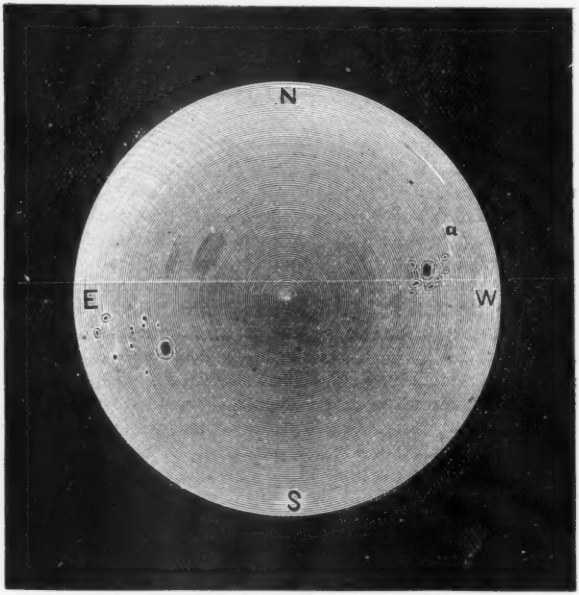
We give the observations and explanations of the figures in Mr. IRISH's own words from several private letters.

"I have been observing the *Sun* quite often, this spring, and not-

ing the changes on his surface. I have to report for the MESSENGER a phenomenon which I observed on the 10th day of last April.

"At 10 A. M. I observed two large spots, one of which was approaching the western edge of the disc, and was within 12 or 14 minutes of it. The other was coming on, and about the same distance from the western limb. The faculæ were very large and very distant in the vicinity of the two spots.

(Fig. 1).



Sun's Disc April 10, 1884.
a. Place of Solar Outburst.

"At 2 o'clock P. M. (10th) I saw, about half way between the first described spot and the edge of the *Sun*, a bright object on the *Sun's* surface. It had the appearance of a column of brilliant matter standing upon the *Sun*. I viewed it every way, by increasing and decreasing the powers, but all the alterations which I made in the instrument still showed it as a column of very brilliant light about eight or ten seconds high. At 4 o'clock I again viewed, when, to my astonishment, it had become somewhat more elongated and had taken on the form of a sheaf of grain, and was about fifteen or twenty seconds high. Its projection from the face of the *Sun* was just what

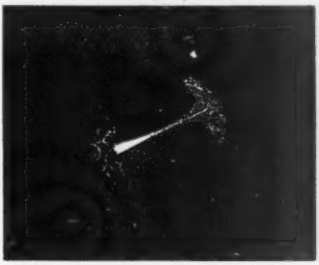
it should be, if it were a column standing perpendicular to the *Sun's* surface at a point where it appeared.

(Fig. 2).

"Figure 2 is reproduced from sketches made at the time of observation. Mrs. IRISH, who saw the phenomenon with me, thinks that sketch No. 3 following is quite perfect.

"In figure 2, I endeavored to show how very much agitated the face of the *Sun* was, in the vicinity of the object, but I must despair of being able to show, by a drawing, those fiercely raging waves, the crests of which seemed as sharply defined on that day as the markings of the *Moon* seen with the same instrument, but they did not equal

(Fig. 3).



Diameter of Sun about 43 inches.

the bright and sharply defined jet which I have pictured. When first seen it had the same breadth and length as in figure 3 from the base

to the place where the top begins to spread out, and it continued as a bright, straight streak for three and one-half hours, after which the top formed in about one and one-half hours.

"I have watched the *Sun* intently since, when the weather would permit, in hope of a repetition of the phenomenon, but none has been seen."

TELESCOPIC METEOR TRAIN.

July 12, 1884, 9h. 30m. A meteor of near first magnitude darted across the southeast sky; path short. Faint train instantly lost. Examining with 5-in. refractor I found very thin strip of lightish smoke; this rapidly bent and curved into a sinuous streak, with moderate motion towards the southeast. Though the *Moon* was just above the horizon I could watch this for three or four minutes. The strip faded from view leaving a small nebulous knot, like a small comet or nebula; this was followed quite easily as it moved among the stars. It would have been impossible to have distinguished this from a nebula save in its motion. It gradually melted from view, having, meanwhile, moved several degrees in a southeasterly direction. The direction of flight of the meteor was from the south to the northeast. This is the first train I have had a chance to observe in sometime, though I have invariably swept the paths of all bright meteors seen —many very much brighter than this one—but there was no train left. I would note that the drifting motion of the train was, as usual in my observations, *easterly* (southeast in this case). E. E. B.

COMET *b*, 1884, (BARNARD.)

On the night of July 16th, while sweeping in the south-western part of my zone, I discovered a suspicious object, which from its absence from my memory and the catalogues at once suggested the probability of its being a comet. A series of pointings were begun with the 6-inch equatorial upon the object and neighboring stars. The mean of four careful pointings gave its place at $9^h\ 33^m\ 55^s$, Nashville M. T., right ascension, $15^h\ 50^m\ 40^s$, south declination, $37°\ 9'\ 52''$. It was close *n. f.* a star of 8^m(?), which star I noticed was of a reddish tinge. The following night (17) was cloudy. On the 18th, the sky was clear for a short time, and the object was examined again. It was located precisely the same with respect to a star which I called 8^m or 9^m, the declination was the same. I at once concluded it was a nebula, but thought it brighter than on the 16th. The sky quickly clouded. On the 19th, the sky was badly clouded, but through breaks I glanced at the object and saw at once it had moved. I had been deceived the night before by the striking similarity of position of comet and star. I described it as brighter, but as it was seen for a few seconds only, may have been deceived. The 20th being clear, the comet was again observed and described as fainter. It is large for a telescopic comet;

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gradually a little brighter in the middle. On the last date I suspected an indefinite rapid brightening to a nucleus near the middle, possibly *f* the centre. It sperads out into hazy indeterminate outlines. Its motion is very slow toward the east, some 20′ daily, with an almost insensible southern motion. E. E. B.

Vanderbilt University Observatory,
Nashville, Tenn., July 21, '84.

The British Association for the advancement of science holds its annual meeting, this year, at Montreal, Canada, August 27 to September 3. Mr. J. D. CRAWFORD is general secretary; his address is P. O. box 147, Montreal, Ca. Of local committee THOMAS CRAMP is chairman, and DAVID A. P. WATT is secretary. Address Molsons' Bank Chambers, 198 St. James street, Montreal. A recent note from Professor C. H. McLEOD, McGill University, states that the invitation of the British Association is extended only to Fellows of the American Association.

ERRONEOUS DESCRIPTION OF A NEBULA.

I have observed a small nebula (since March 24, 1882) that is identified as *General Catalogue* (Herschel's) No. 4036. In that catalogue it is described "eeF(?)." This is erroneous. It is pretty bright, visible in moonlight. I can see it with 1¼-inch finder. When seeing is good, it is very small and very bright, resembling a hazy star; the least change in definition blurs it into a slightly larger mass of light; the description of it in this condition would be

S; PB; vsvmbM * 7^m(?) $1° \pm$ *n. p.*

The place in *Gen. Cat.* for 1860, 0 is $\begin{cases} \alpha\ 14^h\ 57^m\ 46.^s9. \\ \text{N. P. D. } 122°\ 34'\ 35''.2. \end{cases}$

E. E. B.

THE MOON INHABITED.

Recently the newspapers have been freely copying the news of wonderful discoveries said to be made at the astronomical observatory, in Berlin, in respect to the *Moon*. A distinguished professor at that place, whose name is unknown to astronomy, is now prepared to furnish convincing proofs that the *Moon* is the "abode of living, intelligent beings." The discovery was made by accident. As the account has it:

"This learned Doctor found that the observations of the *Moon* gave but very unsatisfactory results owing to the intensity of the light power of the *Moon's* atmosphere, which is that strong that it affects the correctness of the observations in a very high degree."

(If these are the Doctor's own words it is to be feared that he had an attack of *lunacy* when he wrote them.) He then darkens the object-glass with the smoke of camphor, toiling for months, until he gets the right shade, which is then in excellent condition for work as

a photographic lens. It is said to do very sensitive work in catching the details of the lunar surface.

"One of these pictures was placed in a sun microscope which gives it a diameter of fifty-five and one-half feet (the ½ is important). The revelation was most startling. It perfectly overturned all hitherto entertained ideas of the *Moon's* surface. Those level plains which formerly were held to be oceans of water proved to be verdant fields, and what formerly was considered mountains turned out as deserts of sand and oceans of water. Towns and inhabitants of all kinds were plainly discernable, as well as signs of industry and traffic.

If the distinguished SCHROETER had lived long enough to know that such astronomical discoveries were accredited to any of his countrymen, we would doubtless have had, as a consequence, some vigorous German, akin to the strong English which Mr. PROCTOR uses, for the benefit of the so-called earth flatteners.

COMET (*b*), 1884.

The new Barnard Comet is so far south that northern observers will have poor opportunities for seeing it. The comet is quite large in the telescope, but very faint and the moonlight of early August will put it out wholly.

From *Science Observer* we have the following

ELEMENTS.

T	Aug. 17. 63 (Greenwich, M. T.)
ω	304° 12′
Ω	357° 53′
i	7° 2′
q	1.4054

EPHEMERIS.

	α	δ
Aug. 2	16^h 29^m	37° 12′
" 6	16 41	37 4
" 10	16 53	36 52
" 14	17 9	36 31

BOSWELL OBSERVATORY.

A new observatory at Doane College, Crete, Nebraska, has been recently erected, and is now being supplied with astronomical instruments. A cut of the building is given on the opposite page. The equatorial telescope has an object-glass of eight inches aperture, made by the CLARKS. The mounting is furnished at Madison, Wis., Professor G. D. SWEZEY, under whose directions the observatory is being equipped, has already secured a Buff and Burger Transit instrument, a Howard mean time clock, a Sewell break-circuit Chronometer, a Seth Thomas clock and a set of meteorological apparatus.

The building and instruments have cost about $7,000. The observatory will furnish good facilities for instruction in astronomy, and for some branches of original work.

ROSWELL OBSERVATORY.

LARGE METEOR.

April 25, at $10^h\ 27^m$ (Ninetieth meridian time), a magnificent meteor burst into view among the stars of *Corona Borealis*, and moved rather slowly in a southern direction. Place of appearance was about, right ascension $15^h\ 30^m$, and declination $+30°$; disappearance about, $16^h\ 12^m$, and $0°$; no train, very intensely white, illuminating surrounding objects quite distinctly. The meteor flashed out in the rear like a flame. Swept at once with a 5-inch telescope, but found no train. Its extinction was preceded by a great outburst of light, many times brighter than *Venus*. Upon the disappearance of the greater part of the light, the meteor continued its course a few degrees further, as a dull red speck of second or third magnitude. Its total duration seemed to be about two seconds. E. E. B.

PERSONAL.

CHAS. S. WELLS, Portland, Or., formerly of Dudley observatory, Albany, N. Y., kindly gave us interesting astronomical notes recently.

E. E. BARNARD, Nashville, Tenn., gets $200, the Warner prize, for the discovery of second comet belonging to 1884.

On the night of the 25th of July, Professor SWIFT, Warner observatory, discovered five new nebulæ near *Beta Draconis*, and three others previously. One of them is exceedingly elongated, and ought to have been seen before.

Professor SWIFT has our thanks for the names of several new subscribers to the MESSENGER.

Mr. JOHN R. HOOPER, of Baltimore, followed the planet *Venus*, at time of inferior conjunction, and saw her pass the *Sun*, but could not get more than 180° of the circle of light. "The thin crescent was very beautiful, and seemed, in the telescope, to be so large and so near."

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